

XVII.—Notes on American Emydidæ, and Professor Agassiz's Observations on my Catalogue of them. By Dr. J. E. GRAY, F.R.S. &c.

PROFESSOR AGASSIZ, in the appendix and errata to his "Essay on the North-American Tortoises," in the 'Contributions to the Natural History of the United States of America,' published in 1857, observes:—

"*Ptychemys concinna* is mentioned under four different names by Dr. Gray—as *Emys ornata*, *E. floridana*, *E. annulifera*, and *Pseudemys concinna*. *Ptychemys mobilensis* appears twice—as *E. mobilensis* and *E. ventricosa*. *Ptychemys rugosa* also appears twice—as *E. rivulata* and *Pseudemys serrata*. These facts are sufficient to show that Gray's genus *Pseudemys* is not well founded, as the two species which he himself had an opportunity of examining are only varieties of other species which he refers to the old genus *Emys*. I am unable to refer his *Emys callirostris* with certainty, as his figure, though well drawn, does not exhibit the generic characters. I believe it, however, to be one of the many varieties of *Ptychemys concinna*. The same remark applies to *Emys venusta*" (vol. ii. p. 641).

These observations are only founded on an examination of the figures, and not on the specimens themselves, and, as I suspect, on but a cursory study of the descriptions,—which may be an excuse for their inaccuracy; but that is a reason why they ought not to have been made. It is very true that the figures of the entire animal do not and cannot "exhibit the generic characters" used by Professor Agassiz, which are founded on the ridges on the roof of the palate, and can only be seen in a figure of the skull. The observation that these species appear under more than one name is either a disingenuous statement or one that neither Professor Agassiz nor any one else, from the imperfection of the specimens, can confirm or contradict with certainty: consequently any careful zoologist would be very averse to giving an opinion on such a subject, unless he could examine the specimens on which the species are established.

I am satisfied that if Professor Agassiz had examined the specimens of *Emys ornata*, he would himself allow that it not only is not a variety of *Pseudemys concinna*, but that it does not belong to the same genus. *Pseudemys concinna* belongs to his genus *Ptychemys*, and *Emys ornata* to his genus *Trachemys*, according to his characters. I only know *Emys floridana*, as stated in the Catalogue, from Holbrook's figure, and quote it as such; but I am still not satisfied that it is the same as *E. concinna*. As to *E. annulifera*, that is only founded on a very young specimen, which differs in the pattern of its colouring from all the

many young of *E. ornata* I have seen; and, like that species, it is a *Trachemys*, and not a *Ptychemys* of Agassiz. Both *E. venusta* and *E. callirostris*, which the Professor believes to be only varieties of his *Ptychemys concinna*, are also species (and, I believe, most distinct ones) of his genus *Trachemys*.

As to *Emys mobilensis* and *E. ventricosa* being the same, this is only a repetition of the statement I have made in the Catalogue; but this is the case with many other observations which he puts forward as his own, rather than copies of my own corrections. But, as I only knew one species from a shell without any animal, and the other from the figure in Dr. Holbrook's work, I considered it better to let them remain for further examination. Here, again, Professor Agassiz has never seen the original specimen on which *E. ventricosa* is founded.

The same observation is applicable to the proposed union of *E. rivulata* and *Pseudemys serrata*. The former is described from a shell without an animal; and it is so very unlike any specimen of *Pseudemys serrata* that I have seen, that I think it is very unsafe to unite them without further evidence.

This analysis will show how fallacious is the argument that the genus "*Pseudemys* is not well founded, as the two species which he himself had the opportunity of examining are only varieties of other species which he refers to the old genus *Emys*." I may first observe that the genus *Pseudemys* is separated from *Emys* by the form of the lower jaw and beak, and the scales and size of the web of the feet—characters only to be seen on the animal (so that my referring *Emys ventricosa* and *E. rivulata* to species described from shells alone, without any part of the animal attached to them, is no proof as cited); secondly, that *E. ornata*, *E. venusta*, *E. callirostris*, and *E. annulifera*, which are founded on perfect specimens, have proved, on examination, not to belong to my genus *Pseudemys* or M. Agassiz's genus *Ptychemys*; and thirdly, that *E. floridana* and *E. mobilensis* are only placed in the Catalogue on the authority of the figures and description of Dr. Holbrook,—all proving that the Professor's observations are not well founded. I might as well say that his genera *Ptychemys* and *Trachemys* are not well founded; for he regards *E. ornata*, *E. venusta*, *E. callirostris*, and *E. annulifera*, from the examination of the figures or descriptions alone, as varieties of *Ptychemys concinna*, when they are, in fact, species of his genus *Trachemys*, which would, according to his argument, prove that these genera are not distinct!

But further, I have no doubt that Professor Agassiz will admit that *Pseudemys* is well founded, when he finds that it and his genus *Ptychemys* are synonyms of one another, founded on nearly the same characters and on the same species, my characters

being taken from the external part of the beak, and his from the ridges on the palate; but then *Pseudemys* has the priority, which may be a grievance.

Now it is quite evident, from these observations, that Prof. Agassiz has never seen these species, and he must have formed these opinions solely on the sight of the plates and descriptions; and I think that he must have read the latter very cursorily, or else he has not understood the importance of some of the characters there given, or I feel convinced that he could never have committed such a mistake; for certainly his practice, as proved by the paper in which these observations are contained, is not to "lump" species together, but rather the contrary, as is proved by his previous work on Fossil Fish, on Echinida, and even by the work here quoted; for I must say, after examining a large series of specimens, from different parts of the United States and of different ages, that I cannot agree with him in separating the specimens of *Chrysemys*, of *Cistudo*, &c., into several species, as he has done; and several of the new species indicated (for he promises to describe them in some future work) appear to be separated on very slight characters; while the species here proposed to be combined not only are most distinct, but belong to different genera, according to the characters which he himself used in the family Emydidæ for the separation of genera.

I am much surprised that such an experienced zoologist should have been led to give such a crude opinion, *ex cathedrâ*, without first examining the type specimens on which the species were founded, or at least specimens obtained from the same locality, which agreed with the description and figures.

My experience as a student of Tortoises does not agree with the opinion expressed by Professor Agassiz "that there are genera among our Emydoids in which neither the tint nor the pattern of coloration affords any specific characters" (vol. i. p. 432, foot-note). It is no doubt true that the tint of colouring is not only liable to vary with age, but is also influenced by the peculiarities of the locality, as the purity and clearness, or muddiness, the stillness or current of the water in which they happen to be located; but as regards the pattern, it is far otherwise. And I cannot think that Professor Agassiz would have made such an observation if he had studied the subject with sufficient care, or even had worked out the observations which I have made on this subject in the Catalogue that he was criticising; for he would there have seen that some of the groups which he has called genera are separated and characterized by the pattern of the colour.

The pattern, to be understood, should be studied in the young animals, and traced up through all the stages until they are full-

grown; for in the full-grown and more adult or aged specimens the colour is apt to become suffused, and the distinctive character of the pattern more or less obscured, or rendered more difficult to analyze; and I am satisfied that the best specific characters of the species are to be derived from such a study.

But not only does the pattern afford good specific characters, but, as far as I have been able to examine them, they seem to give some of the best characters to separate the species into natural groups, either genera or subgenera, as the student may be inclined to regard them. Thus the best character for the group of which *E. ornata* may be considered as the type is furnished by the fact that there is one eye spot under each shield; and an excellent character to separate the species is the position which this spot occupies on the shield in the young and the older specimens, as marked in my Catalogue above cited (p. 24).

As examples of the assistance which the distribution of the colouring-matter, or the pattern, affords in the distinction of the genera, I may observe:—The underside of the margin of most coloured American Emydoids has a series of eye spots. In *Graptemys* the centre of this spot is on the hinder margin of each of the marginal shields; in all the other genera it is on the suture between two neighbouring marginal shields, the spot being on the middle of each of the marginal bones, and the suture of the horny shields alternating with the suture of the bones. The genera *Chrysemys* and *Deirochelys* have a distinct continued vertebral line, not found in any of the other genera, *Chrysemys* being peculiar for having a very distinct well-marked pale edge to the dorsal shields, while *Deirochelys* has a dark spot surrounded by reticulated lines on each shield.

The variegated species of the genus *Trachemys* (if the genus ought not to be restricted to those species) and *Pseudemys* (*Ptychemys*, Agassiz) have several eye spots, which are often more or less confluent and separated by pale or bright-coloured lines under each dorsal shield, the former genus having a convex horny lower beak, and the latter a flattened lower jaw with a small thin lower beak and broadly webbed toes.

The genera *Callichelys* (of which *Emys ornata* may be considered the type) and *Malaclemys* have a single eye spot, surrounded by regular concentric rings, under each dorsal shield. The *Callichelys* have a hard thin skin on the head, and the centre of the rings approaches the hinder edge of the shield as the shields enlarge. Some specimens of this genus have a pale streak down the centre of the nuchal plates. The *Malaclemys* have a soft fleshy skin on the head, the centre of the spot remains in the middle of the shields, and the feet of the latter are largely webbed.

The genera *Deirochelys* and *Graptemys* have a single eye spot under each dorsal shield, which is surrounded with narrow polygonal rings, sending out anastomosing cross lines to the margin. *Deirochelys* has a central continued narrow vertebral streak, not found in *Graptemys*, which is peculiar in having a nodulose vertebral keel invested with oblong rings.

The genus *Chrysemys* is at once known by the pale margin to the dorsal shields, and the continued vertebral streak.

Even the coloured lines on the fore legs seem to be characteristic of genera. In *Trachemys*, for example, the upper streak is continued on to the second toe; and in *Pseudemys* it is bent and continued on to the third or middle toe.

The *Nicotees*, or West-Indian Emydoids, have a nearly uniform-coloured back of the shell, with dark spots on the margin of the shields. In the Catalogue (p. 31) I pointed out the difference in the form of the head and skull of the two species, *E. decussata* and *E. rugosa*. Professor Agassiz refers the first to the genus *Ptychemys*, and the latter to *Trachemys*. They appear to be rather aberrant species of these genera, without colour, at least in the adult state. I have never seen young specimens of either. Do they in that state show the pattern which is typical of these genera? for it is the younger animals that have the colours most distinctly marked, and on which the disposition is best studied. It is therefore more remarkable that Professor Agassiz should make the statement that is here quoted, as he has studied these animals in their young state, and figured the newly hatched specimens of most of the North-American species; but the pattern, in some of the figures, is not so distinct as it might be, or as it is in the specimens, even when they have been preserved in spirits.

In the Catalogue will be found several additional observations showing the coloration of the species of these genera.

The following are the genera and synonyma of the North-American Emydoids:—

DEIROCHELYS, Agassiz, Contrib. i. 414 (1857).

D. reticularia, Agassiz, 414, t. 1. f. 44; 16, t. 2. f. 1-3 (young).

Emys reticularia, Gray, Cat. 27.

GRAPTEMYS, Agassiz, Contrib. i. 436 (1857). = *Emys*, Sect. **§§ Gray, Cat. Shield Rept. 29 (1855).

1. *G. geographica*, Agassiz, Contrib. 436, t. 2. f. 7, 9. *E. geographica*, Gray, Cat. l. c. 29.

2. *G. pseudogeographica*. *Emys pseudogeographica*, Gray, l. c. 29; Holbrook, t. 15. *G. Lesueurii*, Agassiz, Cont. p. 436, t. 2. f. 10, 12.

CALLICHELYS, n. g. = *Emys*, Sect. *§ Gray, Cat. Shield Rept. 24 (1855).

1. *C. ornata* = *E. ornata*, Gray, Cat. Shield Rept. p. 24, t. 12.
2. *C. venusta* = *E. venusta*, Gray, l. c. 24, t. 12 a.
3. *C. callirostris* = *E. callirostris*, Gray, l. c. 25, t. 12 b.
4. *C. ? pulcherrimus* = *E. pulcherrimus*, Gray, l. c. 25, t. 25. f. 1, 2.

TRACHEMYS, Agassiz, Contrib. 434 (1857). = *Emys*, Sect. *§§ Gray, Cat. Shield Rept. 25 (1855).

1. *T. Holbrookii*. *E. Holbrookii*, Gray, Cat. l. c. 25, t. 15. f. 1. *E. cumberlandensis*, Holbrook, t. 18. *E. sanguinolenta*, Gray, Cat. l. c. t. 15. f. 1. *T. elegans*, Agassiz, Contrib. i. 435, t. 3. f. 9-11. *E. elegans*, Neuwied.
2. *T. scripta*, Gray, l. c. 26. *E. serrata*, Holbrook, t. 5. *T. scaber*, Agassiz, Contrib. i. 434, t. 2. f. 13-15 (young).
3. *T. Troostii*, Agassiz, Contrib. 435. *Emys Troostii*, Gray, l. c. 28; Holbrook, 1, t. 20.
4. *T. rugosa*, Agassiz, Contrib. 436. *Emys rugosa*, Gray, Cat. 31; Shaw, Zool. iii. t. 4. Var. ? *vermiculata*, Gray, Cat. t. 12 d.

CHRYSEMYS, Gray, Cat. Tort. 27 (1844); Agassiz, Contrib. i. 438 (1857).

1. *C. picta*, Gray, Cat. l. c. 33; Agassiz, Contrib. i. 438, t. 1. f. 1-5, t. 3. f. 4, t. 9. f. 22, 23.
C. Bellii, Gray, l. c. 33; Agassiz, Contrib. i. 439, t. 6. f. 8, 9 (very young).
C. Orbigniensis, Agassiz, Contrib. 444, t. 3. f. 1, 3 (young) = *C. Nuttallii*, Agassiz, Contrib. ii. 642.
C. marginata, Agassiz, Contrib. 439, t. 1. f. 6, t. 5. f. 1.
C. dorsalis, Agassiz, Contrib. 440.

I do not say these local varieties are not distinct, but they are not characterized; and the series in the Museum shows that the species is very variable, and seems to include some of them.

I formerly separated *C. Bellii*, which, when I had only a single specimen, I thought probably might be distinct.

MALACLEMYS, Gray, Cat. Tort. Brit. Mus. 28 (1844). *Emys*, §** Gray, 1828. *Malacoclemys*, Agassiz, Contrib. i. 437. *Euchyloclemys*, Sclater, Ann. & Mag. Nat. Hist. i. 292 (1858).

M. concentrica, Gray, Cat. l. c. 37. *Malacoclemys palustris*, Agassiz, Contrib. i. 437, t. 1. f. 10-12 (young).

Professor Agassiz truly observes, "this species varies most re-

markably in its colour and sculpture, as well as in the size of the head,"—all characters used to separate other species of Terrapins.

E. areolata, Dum. (Arch. Mus. vi. 223, t. 14), is also regarded as a variety from Central America.

PSEUDEMYNS, Gray, Proc. Zool. Soc. 1855, 197; Cat. Shield Rept. 35 (1855). = *Ptychemys*, Agassiz, Contrib. i. 431 (1857). *Nectemys*, Agassiz, Contrib. ii. 642 (1857).

1. *P. concinna*, Gray, Cat. l. c. 34. *Ptychemys concinna*, Agass. Contrib. i. 432, t. 1. f. 13, t. 2. f. 4–6 (adult). *Emys floridana*, Holbrook, t. 8 (vide Agassiz).
2. *P. hieroglyphica*, Gray, l. c. 34. *Emys h.*, Holbrook, t. 17.
3. *P. mobilensis*. *Ptychemys mobilensis*, Agassiz, Contrib. 433, t. 3. f. 14, 16. *E. mobilensis*, Holbrook, t. 9. *E. ventricosa*, Gray, Cat. l. c. 28?
4. *P. serrata*, Gray, l. c. 34. *Ptychemys rugosa*, Agassiz, Contrib. 431, t. 26. f. 1, 11, t. 27. f. 1–3. *E. rubriventris*, Holbrook, t. 6. *E. rivulata*, Gray, Cat. t. 11 (vide Agassiz).
5. *Pseudemys decussata*. *Emys decussata*, Bell, Test. t. 1; Gray, Cat. l. c. 20. *Ptychemys decussata*, Agassiz, Contrib. i. 431.
6. *Pseudemys?* *Berardi*. *Emys Berardi*, Dum. & Bibr. *Emys D'Orbignyii*, Dum. & Bibr. Erp. Gén.; D'Orb. Voy. Amér. Mérid. Rept. t. 1, from Buenos Ayres. Probably belonging to this genus, from the distribution of the colour; but it is peculiar for having a pale margin to the dark sternum, like *Rhinoclemys*.

I am by no means satisfied that these species are well determined, that the extent of the notching and dentation of the beak is a character of the importance that is attached to it, or that when the pattern of the coloration and the changes that each presents have been more carefully studied, they will not afford better characters than those now used. The nuchal shield, as in *Calliclemys*, is often marked with a central streak.

RHINOCLEMYS, Fitzinger, = *Emys* †††, Gray, Cat. Shield Rept. 31 (1855), of Tropical America. Peculiar for being of a dark, nearly uniform colour, with a pale ring round the circumference of the dark sternum.

Some species have the keel of the shell of the same colour as the back; and the head is dark, with a streak on each side of the nose and temple. The toes are very short, with a short web.

1. *Rhinoclemys scabra*. *Emys scabra*, Gray, Cat. l. c. 31, and

E. scabra, No. 2, Gray, Cat. l. c. 78. *Testudo punctularia*, Daudin?

With a spot on each side of the nose, and a band on each side of the crown, from the forehead, across the orbit, to the edge of the temple, and a spot on each side of the occiput. The underside of the margin of the young shell variegated. Throat black, streaked on the sides.

Hab. East coast of tropical America. Guiana; Brit. Mus.

I only know this species in the young state; but they all have the band on the side of the face interrupted by the orbit.

2. *Rhinoclemys Bellii*. *Testudo scabra*, Bell, Test. t. 1, 2 (adult).

Head with a spot on each side of the nose and of the occiput, and with a sinuous urn-shaped band on the crown, over the orbit and temples.

Hab. Tropical America.

The figure differs from any species we have by the superciliary bands being united by a short transverse band in front between the eyes.

3. *Rhinoclemys melanosterna*. *Geoclemmys melanosterna*, Gray, Proc. Zool. Soc. 1861, p. 205. *Emys scabra*, No. 1, Gray, Cat. l. c. p. 78. *E. dorsalis*, Gray, Cat. l. c. 32, t. 14 a (not Spix).

The side of the head with a continued band on each side, from the nose to the temple. Neck with four broad black streaks on the sides; fore legs pale, with some black stripes.

One of the bands on the neck arises from the streak on the face under the eyes, and the upper one from the dark upper margin of the streak on the sides of the head.

Hab. East coast of Tropical America. New Granada, River Buenventura; J. O. Goodridge, Esq. Gulf of Darien.

Emys dorsalis of Spix, Bras. T. II. t. 9. f. 1, 2, which is described and figured from a young specimen, seems to be different from those here described.

One species has the dorsal keel pale, and the head and neck with several pale bands or streaks. The toes are short, conical, without any web; the second and third hinder toes are the least, and nearly equal. I propose to call this group *Callopsis*.

4. *Rhinoclemys annulata*. *Geoclemmys annulata*, Gray, Proc. Zool. Soc. 1860, 231, t.

Hab. West coast of America. Esmeraldas, in Ecuador; Frazer. Gulf of Darien; Salvin.